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BEFORE THE BOARD OF PATENT APPEALS
AND INTERFERENCES

Application Number: 09/669,556
Filing Date: September 26, 2000
Appellant(s): SIMMEN, DAVID E.

MAILED

JUL 26 2007

Technology Center 2100

Gates & Cooper LLP
For Appellant

EXAMINER'S ANSWER

This is in response to the appeal brief filed 05/02/07 appealing from the Office action

mailed 12/05/06.

(1) Real Party in Interest

A statement identifying by name the real party in interest is contained in the brief.

(2) Related Appeals and Interferences

The following are the related appeals, interferences, and judicial proceedings known to the examiner, which may be related to, directly affect or be directly affected by or have a bearing on the Board's decision in the pending appeal:

10/807,871

(3) Status of Claims

The statement of the status of claims contained in the brief is correct.

(4) Status of Amendments After Final

The appellant's statement of the status of amendments after final rejection contained in the brief is correct.

(5) Summary of Claimed Subject Matter

The summary of claimed subject matter contained in the brief is correct.

(6) Grounds of Rejection to be Reviewed on Appeal

The appellant's statement of the grounds of rejection to be reviewed on appeal is correct.

(7) Claims Appendix

The copy of the appealed claims contained in the Appendix to the brief is correct.

(8) Evidence Relied Upon

| 2003/0088558 | Zaharioudakis | 05-2003 |
| 6496819 | Bello | 12-2002 |

(9) Grounds of Rejection

The following ground(s) of rejection are applicable to the appealed claims:

Claim Rejections - 35 USC § 102

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that

form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

Claims 1, 3-4, 11, 13-14, 21, 23-24 are rejected under 35 U.S.C. 102(e) as being

anticipated by Zaharioudakis et al. (US 2003 0088558).

Regarding claims 1, 11 and 21, Bello disclose: a method, an apparatus and an

article of manufacture comprising a program storage medium readable by a computer

and embodying one or more instructions executable by the computer to optimizing

execution of a query that accesses data stored on a data store connected to a computer

(0031, Zaharioudakis) comprising:

generating cardinality estimates (estimate the cost of the rewritten query) for one

or more query execution plans for the query using statistics of one or more tables

(system held statistics on the data to be access as the size of the table, the number of

distinct values in particular column, paragraph 0041, Zharioudakis) that vertically

overlap the query (determines whether the content of an AST overlaps with the content

of an SQL query, paragraph 0043);

using the generated cardinality estimates to determine an optimal query

execution plan for the query (0043, Zharioudakis);

executing the optimal query execution plan for the query in order to access the

data stored on the data store connected to a computer and then output the accessed

data (0041 and 0043, Zharioudakis).

Regarding claims 3, 13 and 23, all the limitations of these claims have been noted in the

rejection of claims 1, 11 and 21 above . In addition, Zharioudakis disclose: wherein the

statistics of the one or more automatic summary tables are used to improve a combined

selectivity estimate of one or more predicates of the query (0041, Zharioudakis).

Regarding claims 4, 14 and 24, all the limitations of these claims have been noted in the

rejection of claims 3, 13 and 23 above. In addition, Zharioudakis disclose: wherein the

predicates are applied by one of the automatic summary tables (0048, Zharioudakis).

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all

obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set
> forth in section 102 of this title, if the differences between the subject matter sought to be patented and
> the prior art are such that the subject matter as a whole would have been obvious at the time the
> invention was made to a person having ordinary skill in the art to which said subject matter pertains.
> Patentability shall not be negatived by the manner in which the invention was made.

Claims 5-10, 15-20, 25-30 are rejected under 35 U.S.C. 103(a) as being

unpatentable over Zaharioudakis et al. (US 20030088558) (Zaharioudakis) in view of

Bello et al. (US 6496819).

Claims 5, 15, and 25, all the limitations of these claims have been noted in the rejection

of claims 3, 13 and 23 above. In addition, Zaharioudakis didn't disclose: wherein the selectivity

estimate comprises a ratio of a cardinality of the automatic summary table to a product of

cardinalities of base tables referenced in the automatic summary table and the query. On the

other hand, Bello discloses: wherein the selectivity estimate comprises a ratio of a cardinality

of the automatic summary table to a product of cardinalities of base tables referenced in the

automatic summary table and the query (col. 10, lines 45-67, Bello). Thus, at the time invention

was made, it would have been obvious to a person of ordinary skill in the art to include wherein

the selectivity estimate comprises a ratio of a cardinality of the automatic summary table to a

product of cardinalities of base tables referenced in the automatic summary table and the

query in the system of Zaharioudakis as taught by Bello. The motivation being to enable the

query reduction factor to estimates how useful it will be to access the materialized view to

process the received query (col. 10, lines 42-45, Bello).

Regarding claims 6, 16 and 26, all the limitations of these claims have been

noted in the rejection of claims 3, 13 and 23 above. In addition, Zaharioudakis didn't

disclose: wherein zero or more predicates of the query are applied by one of the

automatic summary tables and wherein the remaining predicates are eligible to be

applied on the automatic summary table. On the other hand, Bello discloses: wherein

zero or more predicates of the query are applied by one of the automatic summary

tables and wherein the remaining predicates are eligible to be applied on the automatic

summary table (col. 10, lines 20-45, Bello). Thus, at the time invention was made, it

would have been obvious to a person of ordinary skill in the art to include the remaining

predicates are eligible to be applied on the automatic summary table in the system of

Bello as taught by Bello. The motivation being to enable the system determines

whether the materialized view is actually eligible to be used in rewrite of the received

query to reduce the execution cost of the query.

Regarding claims 7, 17 and 27, all the limitations of these claims have been noted in the

rejection of claims 6, 16 and 26 above. In addition, Zaharioudakis /Bello discloses: wherein a

predicate is eligible to be applied on the automatic summary table if it can be evaluated using

the output columns and expressions of the automatic summary table (col. 11, lines 30-55,

Bello).

Regarding claims 8, 18 and 28, all the limitations of these claims have been

noted in the rejection of claims 7, 17 and 27 above. In addition, Zaharioudakis /Bello disclose:

further comprising determining a subpredicate combined selectivity estimate of the unapplied

eligible predicates using column distribution statistics of the automatic summary table (col. 10, lines 30-36, Bello).

Regarding claims 9, 19 and 29, all the limitations of these claims have been noted in the rejection of claims 8, 18 and 28 above. In addition, Zaharioudakis /Bello disclose: wherein a cardinality ratio comprises a ratio of a cardinality of the automatic summary table to a product of cardinalities of base tables referenced in the automatic summary table and the query (col. 10, lines 45-67, Bello).

Regarding claims 10, 20 and 30, all the limitations of these claims have been noted in the rejection of claims 9, 19 and 29 above. In addition, Zaharioudakis /Bello disclose: wherein a cardinality ratio comprises a product of subpredicate combined selectivity estimate and the cardinality ratio (col. 10, lines 45-67, Bello).

(10) Response to Argument

<u>The Applicant's invention</u>

A method, apparatus and an article manufacture of optimizing execution of a query that accesses data stored on a data store connected to a computer.

Some of the definitions from Microsoft computer dictionary that the Examiner relied upon:

Cardinality: According to Microsoft Computer dictionary " In database, cardinal number that indicates how may items that are in a set or group (considered as a property of that grouping."

Therefore, Examiner interprets that cardinality as the size of the table, the number of distinct values in a particular column, etc.

Applicant argue that Zaharioudakis is not a prior art preference because Zahazioudakis has a November 5, 2002 filing date, which is more than two years after the September 26, 2000 filing date of the present application, and which is more than three years after the December 22, 1999 priority date of the present application. Although Zahazioudakis is a continuation-m-part to Utility Application Serial No. 09/502,821, filed on February 11, 2000, which claims priority to Provisional Application Serial No. 60/135,133, filed on May 20, 1999, at least some of the specific portions of Zaharioudakis referred to in the rejections of the Office Action are only entitled to the November 5, 2002 filing date, because these specific portions of Zahatioudakis cannot be found in any of the prior patents. Note, for example, that the rejections of independent claims 1, 11 mad 21 refer to the following portions of Zaharioudakis: paragraphs [0031], [0041] and [0043]. However, Applicant's attorney submits that paragraph [0043] of Zahazioudakis cannot be found in any of the prior patents, paragraph [0043] of Zaharioudakis is not entitled to an effective date earlier than the November 5, 2002 filing date, and thus paragraph [0043] of Zaharioudakis cannot be cited against Applicant's claims.

In response, the provisional Application serial number 60/135133, filed on May 20, 1999 provided all the portions of Zahariousdakis as cited in the rejection as following:

Regarding claims 1, 11 and 21, The provisional application disclose: a method, an apparatus and an article of manufacture comprising a program storage medium readable by a computer and embodying one or more instructions executable by the computer to optimizing execution of a query that accesses data stored on a data store connected to a computer (i.e, a computer system 102 is comprised of one or more processors connected to one or more data storege devcies 104 and 106, such as disk drives, that store one or more relational database, page 6, lines 9-12, provisional application) or (0031, Zaharioudakis) comprising:

generating cardinality estimates (the optimizer may choose to rewrite the query so that it will access the AST instend of one or more of the base tables, the optimizer will rewrite the query if the estimates cost of the rewritten query is less than the original query, 0043, Zaharioudakis or the query can be optimized by re-writing it to use the AST shown fig. 6 using optimizing method detemrining whether the query should be rewritten to take advantage of one or more of the summary tables, page 16, lines 17) for one or more query execution plans for the query using statistics of one or more tables (system held statistics on the data to be access as the size of the table, the number of distinct values in particular column, page 9, lines 20-24 of provisional application or 0031, Zaharioudakis) that vertically overlap the query (matching between query and AST, the query can be optimized by re-writing it to use the AST, page 15, lines 14 to page 16, lines 17) or (0043, Zaharioudakis);

using the generated cardinality estimates to determine an optimal query execution plan for the query (matching between query and AST, the query can be

optimized by re-writing it to use the AST, page 15, lines 14 to page 16, lines 17,

provisional application)   or (0043, Zaharioudakis);

executing the optimal query execution plan for the query in order to access the

data stored on the data store connected to a computer and then output the accessed

data (i.e., the execution of the SQL against the relational database and the ouput of the

result set, page 16, lines 15-18, Provisional application) or (executed steps 316, 0041

and 0043, Zaharioudakis).

Bello teaches" ratio of a cardinality of the automatic summary table to a product of

cardinalities of base tables referenced in the automatic summary table and the query as the

query reduction factor for a materialized view (automatic summary table) is the ration of (1) the

sum of the cardinalities of matching relations in the query that will be replaced by the

materialized view to (2) the cardinality of the materialized view, (col. 10, lines 45-65)."a

materialized view that has bases tables A, B, C, (col. 10, lines 11-19)". Thus, at the time

invention was made, it would have been obvious to a person of ordinary skill in the art to

include wherein the selectivity estimate comprises a ratio of a cardinality of the automatic

summary table to a product of cardinalities of base tables referenced in the automatic

summary table and the query in the system of Zaharioudakis as taught by Bello. The motivation

being to enable the query reduction factor to estimates how useful it will be to access the

materialized view to process the received query (col. 10, lines 42-45, Bello).

Bello teaches : wherein zero or more predicates of the query are applied by one

of the automatic summary tables and wherein the remaining predicates are eligible to

be applied on the automatic summary table (i.e., a query contain A, B, C , D and a

materialized view definition contains the join A, B, E, under these conditions, the join A,

B is the common section, the joins B, C and C, D belong the query delta, and the join B,

E belongs to the materialized view delta, (col. 8, lines 62-67) and (col. 10, lines 20-45,

Bello). Thus, at the time invention was made, it would have been obvious to a person of

ordinary skill in the art to include the remaining predicates are eligible to be applied on

the automatic summary table in the system of Bello as taught by Bello. The motivation

being to enable the system determines whether the materialized view is actually eligible

to be used in rewrite of the received query to reduce the execution cost of the query.

In response to applicant's argument that the examiner's conclusion of

obviousness is based upon improper hindsight reasoning, it must be recognized that

any judgment on obviousness is in a sense necessarily a reconstruction based upon

hindsight reasoning. But so long as it takes into account only knowledge which was

within the level of ordinary skill at the time the claimed invention was made, and does

not include knowledge gleaned only from the applicant's disclosure, such a

reconstruction is proper. See *In re McLaughlin*, 443 F.2d 1392, 170 USPQ 209 (CCPA

1971).

Bello teaches: wherein a predicate is eligible to be applied on the automatic

summary table if it can be evaluated using the output columns and expressions of the

automatic summary table (i.e., The expression to count the number of times a child-

side row is duplicated in a join becomes slightly more complicated when outer joins are

involved, since a child-side row that matches zero parent side rows is reproduced once

in the join result. Thus, the correct scaling factor for a child join column value that does

not match any parent join column value is "1", even though the expression (count

(distinct l.sfk.parallel.s.rowid)) would produce "0" in such cases. To force the

expression to return a "1" when the child side join value does not match any parent

side join values, the following expression may be used: count(distinct

decode(Parent.RowIdentifier, null, `1`, Child.JoinCol parallel. Parent.RowIdentifier))

(col. 18, lines 15-27) and (col. 11, lines 30-55, Bello).

Bello teaches: further comprising determining a subpredicate combined selectivity

estimate of the unapplied eligible predicates using column distribution statistics of the

automatic summary table (i.e., the actual sum of sales for stores 1, 2 and 3 are $12, $18 and

$12 , respectively, however, the values in the sumsales column of summary table 904 for

stores 1, 2 and 30 are $24., 54 and 12, (col. 19, lines 40-55, Bello).

Bello teaches: wherein a cardinality ratio comprises a ratio of a cardinality of the

automatic summary table to a product of cardinalities of base tables referenced in the

automatic summary table and the query (i.e., the query reduction factor for a materialized view is

the ratio of (1) the sum of the cardinalities of matching relations in the query that will replaced by the

materialized view to (2) the cardinality of the materialized view, col. 10, lines 45-67, Bello and the

materialized vies has base tables A, B and C (col. 10, lines 11-12, Bello).

Bello teaches: wherein a cardinality ratio comprises a product of subpredicate combined

selectivity estimate and the cardinality ratio (i.e., the query reduction factor for a materialized view

is the ratio of (1) the sum of the cardinalities of matching relations in the query that will replaced by the

materialized view to (2) the cardinality of the materialized view, col. 10, lines 45-67, Bello and the

materialized vies has base tables A, B and C (col. 10, lines 11-12, Bello).

(11) Related Proceeding(s) Appendix

No decision rendered by a court or the Board is identified by the examiner in the

Related Appeals and Interferences section of this examiner's answer.

For the above reasons, it is believed that the rejections should be sustained.
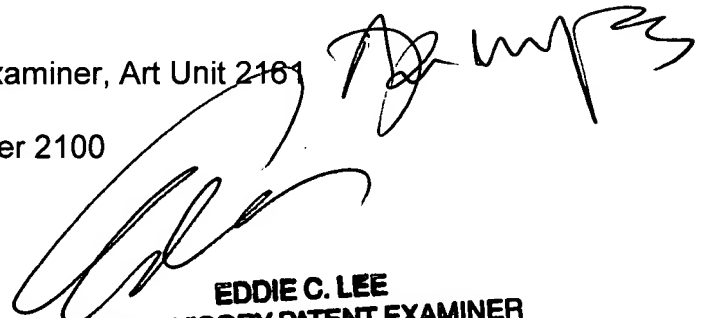
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